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GENE EXPRESSION OF PIP AQUAPORIN (*VRPIP2;7*) GENE IN *VIGNA RADITA* L. PLANT EXPOSURE TO MELATONIN UNDER DROUGHT STRESS CONDITIONS

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ABSTRACT : The study aimed to detect the *VrPIP2;7* gene using PCR approach, as well as to know the effect of the treatment with four increased melatonin concentrations of 50, 100, 150 and 200 ppm in addition to control treatment were 0 ppm on the gene expression of plasma membrane intrinsic proteins (PIP) genes in *Vigna radiata* L. plant exhibition for five periods of drought which is irrigation every 24 hours, 48 hours, 5 days, 10 days and every 15 days.

The electrophoresis of agarose gel at a concentration of 2% showed one band when detecting the *VrPIP2;7* gene with a sizeable 732 bp and using the 100 bp volume index. This gene was selected for sequencing study based on its importance as well as on the results of its gene expression. The sequencing of this gene was recorded on the global site, the National Center for Biotechnology Information (NCBI) and was given an accession number for nucleotide sequences obtained with MT992077.1. The gene expression of the plasma membrane aquaporin gene was studied at the roots of the melatonin-prone mung bean plant under the influence of drought and the results showed that the gene expression of *VrPIP2;7* gene was good and gave remarkable results and for all the periods used, as it was observed at the irrigation period every 24 days and when the concentration of melatonin increased from zero ppm to 100 ppm gene expression increased from 1 to 1.11, as well as the concentration of 150 ppm, gene expression increased to 1.38 compared to control plants, while the irrigation period every 48 hours was observed that all concentrations caused an increase in gene expression with a concentration of more than 50 ppm. The results showed that the irrigation period every 5 days was also good, with an increase in the expression of the *VrPIP2;7* gene and for most of the concentration used with a concentration of more than 50 ppm by giving it the highest genetic expression and an increase of 43% compared to control plants.

The results also indicated that at the irrigation period every 10 days, increased concentrations of melatonin led to an increase in the expression of the *VrPIP2;7* gene, and it was noted that concentrations of 50 and 200 ppm had increased gene expression with a concentration of more than 200 ppm compared to control plants. The results showed that the irrigation period every 15 days had an effect on the increase in the gene expression of *VrPIP2;7* gene and for all the increased concentrations of melatonin with a concentration of more than 150 ppm compared to control plants.

Key words : *Vigna radiata* L., *VrPIP2;7*, PIP genes, drought stress.

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INTRODUCTION

Vigna radiata L. (Mung bean) is one of the plants belonging to the Leguminosae family (Author, 1988) and it is an annual herbaceous summer crop. Its stem is standing or semi-upright branched and covered with fluff; its height ranges between 25-125 cm, and contains triple compound leaves. The flowers of mung bean are with yellowish to yellowish-green color grouped in panicle inflorescences consisting of 5-15 flowers; its horny fruits (leguminous) covered with fluff with green to brown color. The cultivation of mung is spread in most countries of the world, but the tropical and semi-tropical regions are more cultivated, especially in India, China, Bangladesh and Thailand, and it is characterized by being one of the most producing countries of this crop; the cultivation rate of mung is 4 million hectares annually in South and East Asia in the world out of the total cultivation in the world of 5.8 million hectares annually (Al-Janabi and Ali, 1996;

from 1 to 1.92, with rate of 92% compared to the control plants. Similar result was found after using the concentration 150 ppm and the gene expression increased from 1 to 1.95, with rate of 95% in comparison to the control plants, while the concentration 200 ppm increased the gene expression from 1 to 1.40, with rate of 40% compared to the control plants.

The reason for this may be due to the fact that it is known that water stress reduces the hydraulic conductivity of the roots and thus inhibits the growth of roots and plants (Azaizeh *et al*, 1992; Carvajal *et al*, 1999) by decreasing the level of aquaporins, mainly PIPs and TI'Ps (Bursiac *et al*, 2005), in addition to its association with dynamic changes in post-translational modifications such as phosphorylation and mediation that affect the function of aquaporins (Dipietro *et al*, 2013). Therefore, the high levels of *VrPIP2;7* gene expression will molecularly overcome the decrease in the levels of endogenous aquaporins during these stresses, leading to higher water flow to the roots and leaves, which in turn helps to grow under light to moderate stress. This gene is may responsible for increasing of root length (Khan *et al*, 2015) and this result is in agreement with Khan *et al* (2015) study on *Arabidopis thaliana*. Moreover, the activity of occopurines decreases under drought stress due to an imbalance in the regulation of hydraulic conductivity of the roots (Qiao *et al*, 2020). Interestingly, the exogenous melatonin treatment may regulate the gene expression of PIPs and improve the hydraulic regulation of the roots, which caused an increasing their water absorption capacity (Tiwari *et al*, 2020) and these findings are in agreement with Qiao *et al* (2020) study on the corn plant (*Zea mays*).

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